Passive Probes

PM8927(L)
PM8927S

Instruction Manual

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Scientific & Industrial equipment division

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1. INTRODUCTION

The PM 8927 is a 10x attenuator probe, designed for real time oscilloscopes up to 75 MHz, having a BNC input jack and an input resistance of 1 MΩ.
The PM 8927L is a similar probe with a cable length of 2,5m.
At delivery the PM 8927(L) has been adjusted to an oscilloscope with an input capacitance of 15 pF.

2. SPECIFICATIONS

Electrical

Attenuation	10x ± 2% (Oscilloscope input 1 MΩ)
Input resistance d.c.	10 MΩ ± 2% (Oscilloscope input 1 MΩ)
a.c.	See curve Fig. 1.
Input capacitance d.c. and l.f. PM 8927	11 pF ± 1 pF (Oscilloscope input 1 MΩ ± 5% paralleled by 13 pF ± 3 pF)
PM 8927L	14 pF ± 1 pF
Input reactance h.f.	See curve Fig. 1
Compensation range	14 to 40 pF (input capacitance of oscilloscope)
Useful bandwidth	see fig. 2a
Max. input voltage	500 V d.c. + $a.c._{peak}$, derating with frequency. See Fig. 2 Oscilloscope input 1 MΩ and voltage applied between probe tip and earthed part of probe body. Test voltage 1500 $V_{d.c.}$ during 1 s, at a temperature between 15 and 25°C, a rel. hum. of 80% at maximum and at sea level.
Check-zero button probe shell	Same function as 0 position of input coupling switch on oscilloscope.

Environmental

Probe operates within specifications over the following ranges:

Temperature	−25°C to +70°C
Altitude	Up to 5000 metres (15000 feet)
Other environmental data	Same as for any PHILIPS oscilloscope the probe is used with

Mechanical

Dimensions	Probe body 103 mm x 11 mm dia (max.) Cable length 1500 mm or 2500 mm Correction box 55 x 30 x 15 mm incl. BNC
Mass	incl. standard accessories 140 g.

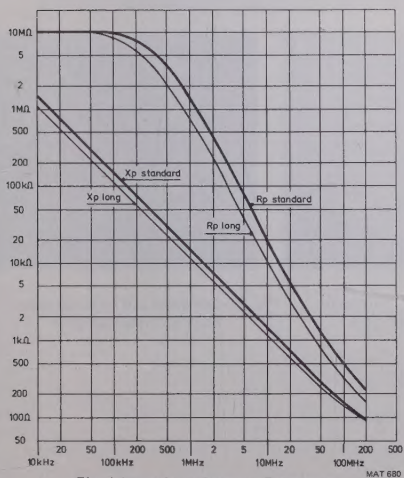

Fig. 1 Input impedance vs Frequency

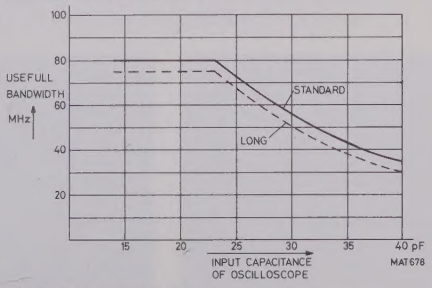

Fig. 2a Useful bandwidth vs Frequency

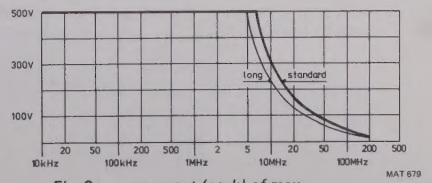

Fig. 2 ac component (peak) of max. input voltage vs Frequency

3. ADJUSTMENTS

3.1. Matching the probe to your oscilloscope

The measuring probe has been adjusted and checked by the manufacturer. However, to match the probe to your oscilloscope, the following manipulation is necessary.
Connect the measuring pin to the CAL socket of the oscilloscope.
A trimmer C2 (Fig. 9) can be adjusted through a hole in the compensation box to obtain optimum square-wave response. See Fig. 3, 4 and 5.

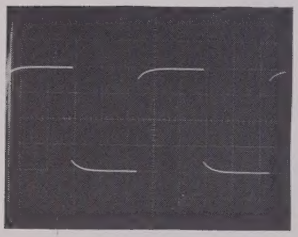

Fig. 3. Over-compensation (adjustment C2)

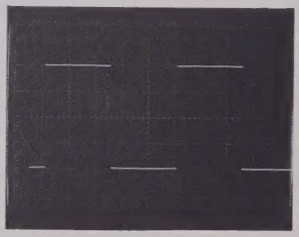

Fig. 4. Correct compensation (adjustment C2)

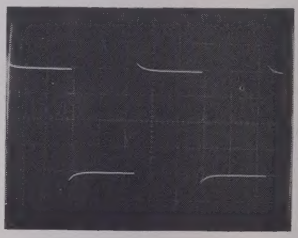

Fig. 5. Under-compensation (adjustment C2)

3.2. Adjusting the h.f. step response

The h.f. step response correction network has been adjusted by the manufacturer to match an average oscilloscope input. For optimum pulse response, however, the probe can be adjusted to match your particular oscilloscope. Later readjustment is only necessary if the probe is to be used with a different type of oscilloscope, or after replacement of an electrical component.
For the adjustment, proceed as follows:
Connect the probe to a fast pulse generator (rise time not exceeding 1 ns) which is terminated by its characteristic impedance. Dismantle the compensation box as described in section 4.2. Set the generator to 100 kHz. Adjust R2 and R3 alternatively to obtain a display as shown in Fig. 6.
It is important that the leading edge is as steep, and the top is as flat, as possible. Incorrect settings of R2 and R3 give rise to pulse distortions as shown in Fig. 7 and 8.

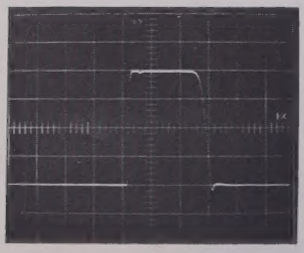

Fig. 6. Preset potentiometers correctly adjusted

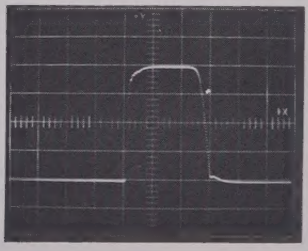

Fig. 7. Rounding due to incorrectly adjusted potentiometers

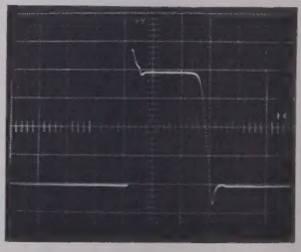

Fig. 8. Overshoot due to incorrectly adjusted potentiometers

4. DISMANTLING

4.1. Dismantling the probe (see Fig. 9)

The front part 11 of the probe can be screwed from the rear part 13. Item 11 can then be slid from 12 and 13.
The RC combination 12 is soldered to 13. For replacement of 12 refer to section 5.1.

4.2. Dismantling the compensation box (see Fig. 9)

Unscrew the ribbed collar of the compensation box to the cable. The case 14 can then be slid of the compensation box sideways. The electrical components on the printed-wiring board are then accessible.

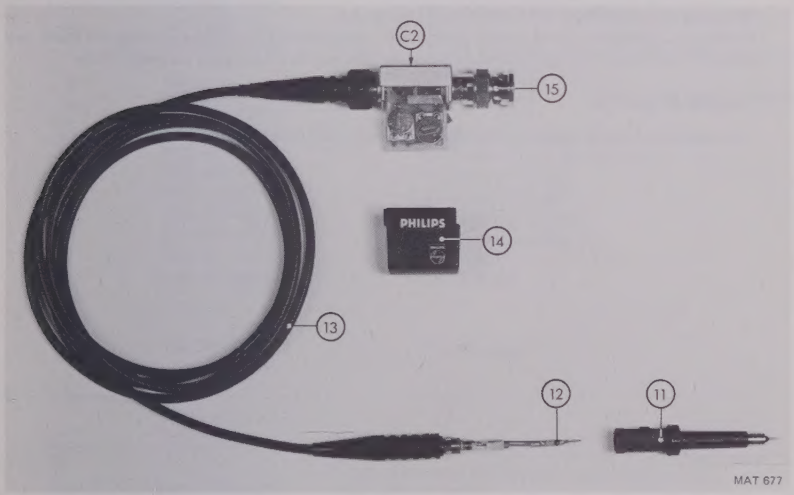

Fig. 9. Dismantling

5. REPLACING PARTS

5.1. Assembling the probe

A new RC network is slid over the cable nipple after which the cable core is soldered on to the resistor wire. When the measuring probe is assembled, the RC network must be at dead centre in the probe tip.

5.2. Replacing the cable assembly

Dismantle the compensation box as described in section 4.2.
Unsolder the connection between the inner conductor and the printed-wiring board. Keep the frame of the compensation box steady and loosen the cable nipple with a 5 mm spanner on the hexagonal part. Replace the cable and fit it working in the reverse order.

5.3. Replacing the BNC

Dismantle de compensation box as described in section 4.2.
Unsolder the connection to the printed-wiring board. Keep the frame of the compensation box steady and loosen the BNC with a 3/8 inch spanner. Replace the BNC and fit it working in the reverse order.

5.4. Replacing the probe tip

The damaged tip can be pulled out by means of a pair of pliers. A new tip must be firmly pushed in.

6. PARTS LISTS

6.1. Mechanical parts (see Fig. 9 and 10)

Items 1 to 10 are standard accessories supplied with the probe.

Item	Order number	Qty	Description
1	5322 321 20223	1	Earth cable
2	5322 256 94136	1	Probe holder
3	5322 255 44026	10	Soldering terminals which may be incorporated in circuits as routine test points
4	5322 532 64223	2	Marking ring red
5	5322 532 64224	2	Marking ring white
	5322 532 64225	2	Marking ring blue (not shown)
6	5322 268 14017	2	Probe tip
7	5322 462 44319	1	Insulating cap to cover metal part of probe during measurements in densely wired circuits
8	5322 462 44318	2	Cap facilitating measurements on dual-in-line integrated circuits
9	5322 264 24018	1	Wrap pin adapter
10	5322 264 24019	1	Spring-loaded test clip
11	5322 264 24021	1	Probe shell with check-zero button
12	5322 216 54152	1	RC network PM 8927
	5322 216 54153	1	RC network PM 8927L
13	5322 320 14063	1	Cable assembly PM 8927
	5322 320 14064	1	Cable assembly PM 8927L
14	5322 447 64016	1	Cap PM 8927
	5322 447 64017	1	Cap PM 8927L
15.	5322 268 44019	1	BNC connector

6.2. Electrical parts

Item	Order number	Description
C1	–	Part of RC network (not supplied separately)
C2	5322 125 54003	Trimmer 60 pF, 300 V
R1	–	Part of RC network (not supplied separately)
R2	5322 101 14047	Potmeter 470 Ω, 20 %, 0,5 W
R3	5322 100 10112	Potmeter 1 kΩ, 20 %, 0,5 W

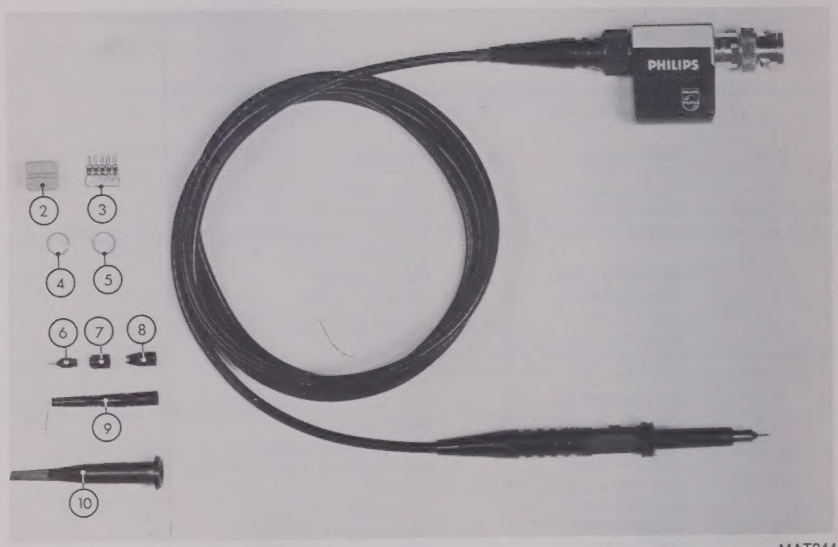

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Fig. 10. Probe and accessories with item numbers

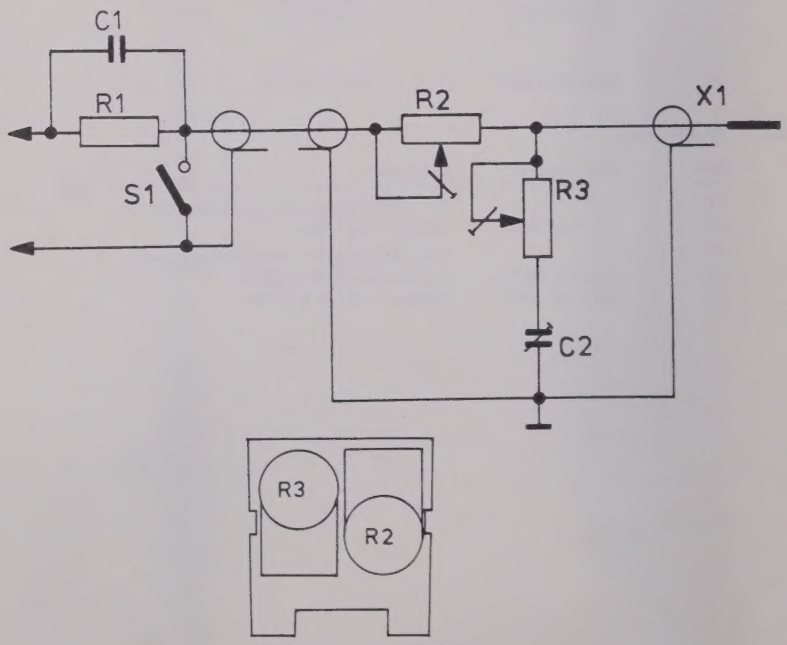

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Fig. 11. Printed-wiring board showing adjusting elements, circuit diagram.

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7. Supplement for the PM 8927S probe

Fig. 7.1 PM 8927S

7.1. Introduction

The PM 8927S is a standard PM 8927 probe provided with a special BNC connector, which makes automatic range indication possible.
The attenuator range is selected by a resistor which is mounted in the holder of the BNC connector.
When the probe is connected with an oscilloscope provided with automatic range indication e.g. PM 3310, this resistor is connected between earth potential and the spring-contact situated on the left side of the BNC socket.
The value of this resistor determines the attenuator range.
The PM 8927S is a 10x attenuator probe designed for real time oscilloscopes up to 80 MHz with an input resistance of 1M Ω.
The probe can be adjusted to oscilloscopes with input capacitances from 14pF up to 40 pF.
At delivery the PM 8927S has been adjusted to an oscilloscope with an input capacitance of 25pF.
The PM 8927S is available with a cable length of 1500 mm.

7.2. Specifications, adjustments and dismantling; see PM 8927(L)

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7.3. Replacing the range indication parts (fig. 2)

- Push the rubber ring (item 16) from the BNC connector in the direction of the compensation box.
- Unsolder the resistor, which is mounted in the holder (item 17), from the contact ring (item 18).
- Lift the lips of the contact ring so that the contact ring can be removed from the holder.
- Remove the two holder halfs.
- Remove the contact spring together with the resistor.

To reassemble the BNC connector with range indication, proceed in reverse order.

Attention: **When soldering the resistor on the lip of the contact ring, use a minimum of soldering tin, to prevent that the soldering point will touch the rubber ring.**

7.4. Parts lists

7.4.1. For probe-parts; see the PM 8927(L)

7.4.2. Range indication parts

Item	Ordering number	Qty	Description
16	5322 532 64278	1	Rubber ring
17	5322 532 64277	2	Holder
18	5322 532 14696	1	Contact ring
19	5322 492 64765	1	Contact spring
R	5322 116 55552	1	Resistor 2k32

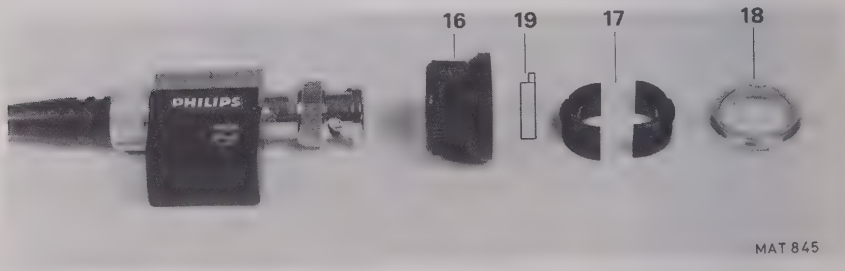

Fig. 7.2 Range indication parts

PM 8927